DOCUMENT RESUME

ED 466 407 SE 066 489

AUTHOR	Minner, Daphne D.
TITLE	Environmental Education Materials Evaluation Questionnaire (EEMEQ): Using Interdisciplinary Theory To Assess Quality.
PUB DATE	2002-06-00
NOTE	47p.; Work completed while author was in a dissertation program at The Pennsylvania State University.
PUB TYPE	Reports - Research (143) -- Tests/Questionnaires (160)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Elementary Secondary Education; *Environmental Education; *Evaluation; *Instructional Materials; Questionnaires

ABSTRACT

In this article, the construction and psychometric properties of the Environmental Education Materials Evaluation Questionnaire (EEMEQ) are described. The EEMEQ was designed to assess the quality (high, medium, or low) of environmental education materials based on interdisciplinary theory and research bridging the fields of education, psychology, and human development intervention. Results from the initial evaluation indicate that the instrument can discriminate differences in quality of materials, indicating that the first step in developing an independent, theoretically based assessment has been taken. Findings from the initial pilot of the EEMEQ on 35 material packages are presented and suggestions for further research are discussed. The EEMEQ is included in this article, but the coding template is not. (Contains 19 references.) (Author/MM)

Reproductions supplied by EDRS are the best that can be made
from the original document.

SE

ED 466 407

Environmental Education Materials Evaluation Questionnaire (EEMEQ): Using Interdisciplinary Theory to Assess Quality

Daphne D. Minner, Ph.D.

For further information or EEMEQ instructions and the coding template contact the author at:

Education Development Center*
55 Chapel Street
Newton, MA 02458-1060

June 2002

*This work was completed while the author was in a dissertation program at The Pennsylvania State University. The EEMEQ was copyrighted as Minner©1998.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

D. Minner

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

SE 6489

BEST COPY AVAILABLE

Abstract

In this article, the construction and psychometric properties of the Environmental Education Materials Evaluation Questionnaire (EEMEQ) are described. The EEMEQ was designed to assess the quality (high, medium, or low) of environmental education materials based on interdisciplinary theory and research bridging the fields of education, psychology, and human development intervention. Results from this initial evaluation indicate that the instrument can discriminate differences in quality of materials, indicating that the first step in developing an independent, theoretically based assessment has been taken. Findings from the initial pilot of the EEMEQ on 35 material packages are presented and suggestions for further research are discussed. The EEMEQ is included in this article, but the coding template is not. Contact the author directly for this information.

Introduction

Currently there is no standardized, objective, multidisciplinary way to evaluate the quality of environmental education (EE) curricular materials. This inability to perform assessments is troubling for several reasons. A curriculum is the framework that shapes the ideas, attitudes and emotional experiences to which learners/program participants are exposed. The curriculum is then supported by the choice of curricular materials. Since curricular materials play such a central role in education/programming, they should reflect the accepted state-of-knowledge about what constitutes quality across disciplines when the very nature of the subject is as interdisciplinary as EE. An appropriate strategy to determine if curricular materials reflect the accepted state-of-knowledge is to evaluate them using psychometrically sound assessment instruments. If the quality of the materials that shape an EE program is understood, then answers to the question of why an EE program succeeds or fails may be explored. If the problem is in the materials, then adjustments can be made to obtain more appropriate/high quality materials. When high quality materials are selected, implementation fidelity and program effectiveness can be determined.

Standardization is essential when comparing one resource to another. However, to date, there has been little effort to develop standardized instruments with demonstrated reliability and validity to assess program components such as educational materials in the EE field, (Leeming, Dwyer, Porter & Cobern, 1993; Iozzi, 1989). There have been efforts to evaluate EE materials by two prominent organizations--the makers of the Environmental Education Toolbox at the University of Michigan (Tourtillott & Britt, 1994) and by the North American Association for Environmental Education (NAAEE) (Simmons, 1995; NAAEE, 1996). The Toolbox manual contains three sample evaluation forms, but none of them are as comprehensive, or originate from the same theoretical background, as the EEMEQ. Although the NAAEE publications are several pages of recommendations for what quality environmental education materials should include, no instrument has been developed to date. There is a need for a standardized, user-friendly instrument designed for use by researchers and educators to assess the quality of materials packages at their disposal.

Given the multidisciplinary content studied in EE programs and curricula, it is prudent to use an interdisciplinary approach to assessment. Human development is a notable example of an area of study that thus far has not been fully utilized within the field of EE (neither in program assessment nor development). Human development is the investigation of individual development in a variety of interrelated contexts (i.e., family, peer, community, and society) over time. Since people are the targets of EE programs and materials, it is essential to understand how individual developmental processes are part of a larger system of interactions that influence environmental learning and behavior.

To explore development from a systems perspective, this paper discusses two system theories—Life-span Perspective (Baltes, 1987) and Motivational Systems Theory (Ford, 1992); and one individual development theory—Piaget's theory of cognitive development (Piaget, 1952). The author demonstrates the adaptation of these conceptual components to EE, and integrates them with EE-specific research findings (Hungerford, Peyton, & Wilke, 1980; North American Association for Environmental Education, 1996; Simmons, 1995) to develop an instrument designed to concretely assess the quality of EE curricular materials. The performance of the developed instrument (EEMEQ) and findings from the initial pilot on 35 material packages are discussed.

Theoretical Foundation

Life-Span Perspective

The area of Human Development is an eclectic discipline that combines theories and methods from several social sciences such as psychology, sociology, demography, anthropology and biology. This approach to studying development benefits researchers and theorists by providing a much broader base from which to draw answers regarding developmental problems. For example, an overarching perspective that serves as a unification tool for this discipline is life-span perspective. Although this perspective has a tradition stretching back at least 200 years, it reemerged as a coherent framework for studying human development in the 1920's (Baltes, Reese, & Lipsitt, 1980). Life-Span is a family of perspectives that constitutes a meta-theory of human development (Baltes, 1987). There are seven basic concepts of this meta-theory that are applicable to environmental education materials (see Table 1).

[Insert Table 1 About Here]

The life-span perspective offers a multifaceted view of development and provides several tangible suggestions for educational materials as indicated in Table 1. Given the nature of human development as dynamic, embedded in a historical context and a result of interactions with the environment (multiple interrelated contexts), the addition of a theoretical framework, such as life-span perspective, can guide decisions about the content of environmental education materials that are likely to be effective. However, because life-span perspective as a meta-theory lacks the specificity needed for concrete evaluation of materials, other theories should be considered.

Motivational Systems Theory

Motivational Systems Theory (Ford, 1992) focuses on how to establish goals that motivate people to achieve competence in a particular domain, such as environmental literacy. Much of education is based on establishing goals and objectives and then measuring success accordingly. Therefore, it is essential to use existing theory about motivation to help establish and evaluate successful educational goals. Motivation is a product of goals, emotions, and personal agency beliefs. Achievement is a product of motivation, skill (within biological constraints), and a responsive environment (Ford, 1992). Thus, if the purpose of curricular materials is to change or foster pro-environment behavior, the materials should address goals, skills, emotions and contextual limitations.

Ford (1992) delineates several suggestions for making educational goals salient to recipients. Educational goals should be clear and set optimally challenging targets for behavior. If the goal of the educator is to facilitate the development of a person's commitment to pursue pro-environment goals in the future, then a link should be established between the future environmental outcome and specific sub-goals that show progress toward that future goal. In establishing goals, there should be attention to specific immediate activities designed to get closer to achieving the set goal. These activities should be explained in terms of other personally relevant goals such as social responsibility, belongingness, equity, or safety (Ford, 1992). To motivate people to do something they would not usually do, curricular materials should organize and design tasks, activities, and experiences to meet as many different pro-environment goals as possible. Finally, flexible standards for goal attainment should allow for different levels of ability and changes as behavior is modified.

Jean Piaget

The last theoretical perspective used to develop the EEMEQ is Piaget's stage theory of development (Piaget, 1952). From this theory, guidelines can be determined for what children within a certain age range are likely to be able to do and understand. The preoperational stage of cognitive development (ages two to six) is marked by the child's tendency to focus on the most salient aspect of whatever is being thought about. The most commonly known manifestation of the centration tendency is egocentric thinking, which is the lack of the ability to consider the perspective of others. Other common characteristics of preoperational thought are the confusion of the appearance of an object with the real essence of that object, illogical thinking and lack of understanding of cause and effect relations (Piaget, 1952).

Concrete operational thinking emerges in the child around the age of six and lasts until about age twelve. During this period, the child becomes less egocentric and is capable of mental operations that organize, combine, separate, and transform objects and actions. These mental processes take place only in the presence of the objects or events being thought about, and are thus concrete. In conjunction with these changes in cognitive skills, the child also experiences truly reciprocal social relationships for the first time (Piaget, 1952).

The formal operational period begins around age twelve and continues throughout the remainder of the lifespan. The most salient characteristic of this stage is the emergence of abstract thinking—when the child manipulates ideas without tangible representations, and all of the logical relationships in a given problem are thought through systematically. Socially, peer relationships become paramount with the onset of puberty (Piaget, 1952). Though there have been numerous challenges and modifications to Piaget's stage-theory conceptualization of social and cognitive development (Flavell, 1971; Fischer, 1980; Case, 1991; Fodor, 1983), it continues to be one of the most useful theories of development for educators.

In conjunction with these three developmental theories, Life Span Perspective, Motivational Systems Theory, and Piaget, the work of Hungerford, Peyton, & Wilke (1980); the North American Association for Environmental Education (1996); and Simmons (1995) provide some of the subject specific components of quality EE materials. Table 2 provides the components and sources from the environmental education field that were used in the development of the EEMEQ.

[Insert Table 2 About Here]

The theoretical and empirical base as described above fueled the generation of the questions for the EEMEQ. The specific research questions for this project are: (1) Can a valid assessment instrument, based largely on human development theory and EE research, be developed that reliably discriminates high, moderate, and low quality in EE materials; and (2) If so, what gaps emerge when the EEMEQ is applied to a variety of EE materials packages?

Methods

Questionnaire Description

The final questionnaire contained 92 questions divided between four sections. The first section of the questionnaire (EE goal implementation) addresses the specific conceptual content of the educational lessons in the curriculum. The second section (contextual sensitivity) addresses how sensitive the educational lessons are to diversity issues. The third section (teacher support and student motivation) addresses how effectively the design of the lessons meet teacher and student needs. The final section (developmental appropriateness) addresses how appropriate

the lessons are in the skills they demand of children of differing age groups (see Appendix A for revised questionnaire which reflects deletion of unreliable items and clarification and reformatting of some questions).

Materials Review Procedure

Using the questionnaire, 35 EE materials packages were evaluated to generate the data for this study. A publication was considered "curricular materials/materials package" if it (1) included a collection of lessons around a common theme(s) or topic(s); and (2) had an overall organizational structure. The materials reviewed represent a range in quality, topics, publishers, and age of target audience. During training with research assistants, several packages were reviewed, scoring was discussed in group meetings until discrepancies were clarified and assistants reliably and consistently understood the questions on the questionnaire.

Within each materials package, a representative sample of lessons was constructed to capture the range in instructional delivery, topics, and other unique characteristics of the materials package (see Appendix B for listing of materials package and Appendix C for summary of characteristics). Each materials package was reviewed by the author and research assistants (one assistant per section of the questionnaire) to determine interrater-reliability. Seven curricula were twice reviewed (separated by a two week interval) by the same research assistant to determine test-retest reliability. Each reviewer read a selected lesson and answered the questionnaire for that lesson before proceeding to the next lesson. Upon completion of the lesson reviews for a materials package, the reviewer checked the appropriate box for each question that represented the percentage of lessons in the materials package that addressed each question (see Appendix A).

After each of the packages had been reviewed, the questionnaires were "coded", or translated from checks in boxes to numbers for statistical analysis. A "0", "1", "2", or "3" was assigned to each percentage category for each question depending on the theoretically determined relationship to quality. Then the scores for the questions in each section were summed to get a total score for each section, as well as an overall score across all sections.

Because no one better understands the intent of the items on the EEMEQ than the developer herself, the author is arguably the "gold standard" by which to compare all other raters. Therefore, the author's ratings were used in comparison to the other reviewers for the assessment of interrater-reliability and criterion-related validity.

To determine whether a curriculum as a whole was low, medium, or high quality, a ranking scheme was developed using the author's summed scores distribution across all 35 materials packages. Cut-offs for the ranks (low, medium, high) were determined by visually examining the author's stem and leaf distribution and the corresponding percentages to see the natural breaks in the distribution. After the cut-offs were determined from the author's data, they were applied to all of the other coders' data and an overall rating was assigned to each materials package for both the author's data and the other coders' data.

Reliability and Validity Assessment Procedures

The underlying measurement model for the EEMEQ is based on "cause indicators" of the quality construct rather than "effect indicators" as Classical Test Theory assumes (Bollen & Lennox, 1991). The construct (quality rating) is the dependent variable and the causal indicators (questions) are the independent variables. For example, overall quality of the materials

(construct) is, in part, caused by whether or not the lessons contain background information that explains the key concepts used (questionnaire item). The reverse (e.g., that the overall quality of the materials causes lessons to contain background information) is not true.

In the cause indicators measurement model, the items are independent from one another and a correlation is assumed not to exist (it may or may not) (Bollen & Lennox, 1991). For example, the cognitive skills required to complete a lesson has no bearing on whether or not the lesson contains background information, yet both are factors that relate to overall quality of the materials package. Therefore, conducting factor analysis or examining the correlation matrices is not an appropriate way to select or reduce questionnaire items. Because the items on the questionnaire independently contribute to the construct of quality, they are not considered exchangeable items from a single domain. Therefore, using internal consistency as a reliability assessment is inappropriate for the EEMEQ (Bollen & Lennox, 1991).

Accordingly, other forms of reliability and validity were assessed to determine the performance of the instrument. The stability of the instrument was assessed through two forms of reliability--interrater and test-retest. Interrater reliability determines the stability between raters' scores, whereas test-retest determines stability over time of the same rater's scores (Vogt, 1993). Three kinds of validity were also assessed—content, criterion-related, and construct. For this study, content validity is the demonstration that all factors essential for assessing the quality of EE materials has been included in the questionnaire. Criterion-related validity is determined by how well the questionnaire predicts to an independent criterion (Vogt, 1993). Construct validity in this study is defined as how well the questions accurately reflect the theoretical constructs from which they were derived. To assess whether the questionnaire is reliable and valid, data in the questionnaire were analyzed at different levels (question, section, overall rating) using various statistical procedures.

Cohen's Kappa (Cohen, 1960) was used to determine the interrater-reliability at the question level between the author and all other coders. Kappa "is the proportion of agreement after chance agreement is removed from consideration" (Cohen, 1960, p. 40). The upper limit for Kappa is +1.00 (perfect agreement), whereby 0 means there is no agreement. A negative association means there is opposition in the scores.

Pearson's Product-Moment Correlation Coefficient was calculated to show the degree of linear relationship between the author's scores and the other coders' scores (interrater reliability at section and overall rating levels, and criterion-related validity at the overall rating level) and between the same coder at two time points (test-retest reliability at the question, section and overall rating levels). This correlation coefficient has a range of -1.00 (inverse relationship) to +1.00 (perfect correlation). The significance of the coefficient was determined using the standard .05 alpha level.

Content validity was addressed by a thorough review of the literature within the fields of EE and human development interventions. After a thorough review of relevant research articles and applied publications, including educational guidelines, content validity of the questionnaire was established and determined to be sufficient to discriminate among low, medium and high quality EE materials.

Criterion-related validity was assessed through a survey of five experienced environmental educators in the field of EE. A listing of the names of the materials packages in the study, including three quality options (Low, Medium, High), was mailed to each person. Each

educator was asked to review the list for the materials with which they were familiar and to choose a quality option for each.

Construct validity was assessed via a review panel of 15 people, each of whom read the theoretical basis for each question to determine if the question accurately addressed the specified construct. If the questions were determined to be vague, changes were made for clarification purposes. As this constitutes the initial stages of determining construct validity, it should not be considered definitive.

Reliability was assessed within a range rather than by using strict cut-offs for reliable and unreliable. The rationale for this approach is three-fold. First, the low number of test-retest packages reviewed (n=7) allows only large correlations (above .7) to be significant. Because the power of the correlational tests is so low, a range of reliability more accurately captures the performance of the questionnaire. A second reason for using this approach relates to the rigor of the Kappa statistic. By excluding chance agreements, the Kappa statistic only measures "true" agreement between coders, which always produces lower results than a standard correlation. Finally, reliability was assessed using a range because this research is at the very beginning stages of conceptualizing EE materials quality in an interdisciplinary way. Therefore, it is reasonable to tolerate higher levels of error (lower correlation coefficients) and still be able to determine whether this approach has promise and is worth pursuing more rigorously (Pedhazur & Pedhazur Schmelkin, 1991).

The determination of reliability was made using the following standards:

- Kappa coefficients < .2 = low reliability
- .2 ≤ Kappa coefficients ≤ .4 = medium reliability
- Kappa coefficients > .4 = high reliability
- Pearson correlation coefficients < .4 = low reliability
- .4 ≤ Pearson correlation coefficients < .6 = medium reliability
- Pearson correlation coefficients ≥ .6 = high reliability

To determine the success of each section, the percent of reliable items within each section was calculated. "Items" include distinct questions, as well as sum scores (when questions were tallied) and overall ratings (low, medium, high quality). Dividing the number of highly and moderately reliable items by the total items calculated in interrater Kappa, and test-retest correlation, respectively, determined the percentage. All statistical differences are described using the following significance level notation: *.05, **.01, and ***.001.

Findings

Reliability

Overall findings indicate that 24 questions (26%) (N=92 distinct items, not including the section or overall sum and rating scores) on the questionnaire demonstrated a high level of interrater reliability, and 44 of the questions (48%) demonstrated a moderate level of interrater reliability. Sixty-three questions (68%) demonstrated high test-retest reliability and five (5%) a moderate level. Fifty-two of the questions (57%) on the questionnaire were reliable (high or moderate) both across time and raters. Only eight questions (9%) did not demonstrate either interrater or test-retest reliability. The preponderance of evidence indicates that the EE goal implementation section performed the best, followed by the teacher support and student motivation section, the contextual sensitivity section and the developmental appropriateness sections (see Table 3).

[Insert Table 3 About Here]

The correlation of the overall rating of low, medium or high quality between the author and the other coders was .462** (moderately reliable) and the test-retest correlation was .639 (highly reliable). These findings indicate that the EEMEQ needs some revision to make the questions more easily understood by a variety of users. The developmental appropriateness section of the questionnaire, in particular, demonstrated low reliability, which could affect the overall rating. Modifications addressing the issues of question clarity and specificity are located in Appendix A.

Criterion-Related Validity

The criterion-related validity correlational results were significant, but the magnitude of the correlation demonstrates a low positive association (r=.24**). This correlation was calculated by entering the author's overall rating (1=low quality, 2=medium quality, or 3=high quality) for each curriculum paired with each of the other evaluators' ratings. The total n was 97 pairings. As a means for comparison, a correlation was calculated for each of the evaluator's ratings paired with every other evaluator's ratings for the same curriculum (n=95 pairings). The correlation was only moderately positive and significant (r=.37***), indicating that there is not a great deal of consensus among the evaluators in this study about the quality of a large number of materials packages.

Materials Packages Ratings

The ratings discussed in the following findings are based on the ratings of the EEMEQ developer (author). Overall ratings indicate that the majority of the packages reviewed (15, 43%) were rated low quality, 14 (40%) were medium quality and six (17%) were high quality. Specific ratings for each package reviewed are in Appendix C.

[Insert Table 4 About Here]

Questions Relating to Quality of EE Goal Implementation

There are five sub-sections in this section: environmental issues investigation, ecological foundational knowledge, connection of humans to ecosystem, values clarification, and pro-environment behavior awareness and skills (see Table 4). The results for each subsection will be discussed in turn.

Environmental issues investigation

If any reviewed lesson addressed a topic, this questionnaire item was rated for the entire package. Therefore, it is very easy for a package to rate high on diversity of topics covered. Topics coded and the corresponding frequency (percentages) of packages addressing these topics in at least one lesson include: water quality 20 (57%), land use 19 (54%), air quality 18 (51%), waste 17 (49%), energy 14 (40%), wildlife and habitat loss 13 (37%), soil quality and quantity 10 (29%), and human population and health six (17%).

However, the comprehensiveness of the context within which these issues are placed is sorely lacking. Issues are predominantly discussed in the local context (n=28, 80%), with between 14% and 23% of the packages also placing environmental issues in broader contexts (state, regional, national, or global). The packages within temporal context (either future or past), performed better, but still could use improvement. Eighty percent of the packages (n=28) discussed environmental issues in an immediate temporal frame, with 60% (n=21) using ± 50

years, and 54% (n=19) using more than ± 100 years. The majority of packages reviewed had very few lessons that discussed solutions to environmental problems.

Ecological foundational knowledge and Connection of humans to ecosystem

There was a diversity of ecosystem components also covered in the packages reviewed. Coding was completed for seven components: water, humans, soil, animals, plants, air, and sunlight. Most of the packages (n=33, 94%) discussed between four and seven of these components. Materials package coverage of each of the following needs significant improvement: ecosystem cycles; functions (materials cycling, food chain, homeostasis); interactions among ecosystem components; and the ecological implications of human's activities. The majority of packages had very few sampled lessons addressing these topics. The connection of humans to the ecosystem faired even worse. Most of the packages reviewed had no lessons directly discussing human's dependence on nature or other concerns like personal safety, social responsibility, or equality relating to environmental issues.

Values clarification and Pro-environment behavior awareness and skills

Most of the packages did not have lessons on values clarification for either the student's own values or other people's values. The components relating to pro-environmental behavior were only marginally better. The majority of the packages had very few lessons that were relevant to a student's personal daily life or discussed how our daily activities and choices affect the environment. Most packages had few to no lessons that model environmentally responsible behavior, which reflects a loss of teachable opportunities. There were also few opportunities for students to gain specific training and practice in solving environmental problems. Most of the packages had no lessons on engaging in citizenship action or providing information about such activities. In addition, no lessons explored the balance between human and ecological costs and benefits of an action.

[Insert Table 5 About Here]

Questions Relating to Quality of Contextual Sensitivity

There are four sub-categories relating to contextual sensitivity: sensitivity to different settings; cost; different users; and bias (see Table 5).

Different settings and Cost

In relation to space, the packages reviewed were rated the highest with few to no lessons requiring a specific physical space or habitat. However, the flexibility of the package was lower quality for use in different kinds of settings and for being conducted either indoors or outdoors. An encouraging finding was that most packages reviewed were low cost (under $10) and did not require special equipment for lessons.

Different users

Although mostly positive, sensitivity to different users revealed mixed results. Most packages showed flexibility about different kinds of learning styles by providing a variety of teaching methods and conveying key concepts in several ways (auditory, visual, tactile). Most packages built on existing student knowledge by using an integrated approach to EE by incorporating information or techniques from at least two academic subject areas. Most packages had lessons that also discussed how students could help the environment as members of a social network. Far fewer packages had lessons that routinely assess students' baseline understanding and skills. Ethnic and cultural minorities are rarely represented in illustrations accompanying the lessons, perhaps making it more difficult for minority students to relate to the material.

Bias

Though there is clearly an ethnic bias in the illustrations used in the packages reviewed, other types of bias (outdated, unknown developers, one perspective presented) were not present in the majority of packages. Most were up-to-date, had clearly identified who developed and reviewed the packages and presented causes and consequences to environmental issues in a balanced way.

[Insert Table 6 About Here]

Questions Relating to Quality of Teacher Support and Student Motivation

This set of questions addresses how well a package supports a teacher's educational efforts and how well it is designed to increase student motivation (see Table 6).

Teacher support

Most of the packages reviewed were rated high quality for supporting the teacher by: providing background material that explains key concepts in the lessons; providing information on additional general resources; having lessons that are variable in the time of the year they can be conducted; and providing lessons that are logically connected to each other. By providing lessons of variable lengths, teachers could more easily fit them into the class plan. Providing more information about resources on specific lesson content would also be an improvement.

Student motivation

To create competence in an individual, it is essential to provide: (1) skills to achieve stated goals; (2) have a responsive environment within which to use these new skills and knowledge; and (3) have a way to evaluate whether or not you are reaching competence (Ford, 1992). The majority of the packages reviewed rated high quality on these three components. The components related to motivation that were rated low quality, with none or very few lessons addressing them, include: increasing personal agency beliefs; facilitating positive emotional experiences about the natural world; influencing thoughts, emotions and behaviors simultaneously; and having clearly connected short and long-term goals.

[Insert Table 7 About Here]

Questions Relating to Quality of Developmental Appropriateness for Children ages 5-7, 8-11, and 12-18

These questions were designed to assess how appropriate educational lessons were considering the physical, social and cognitive skills of students at different ages (see Table 7).

Physical and social skills

The physical demands of a lesson were only reviewed for the youngest group of children (ages 5-7), who have limited capacities in this area. Of the packages that were reviewed for this age range, the demands on physical skills were all developmentally appropriate. In terms of social skills, the packages reviewed demonstrated a pattern that indicates developers have a minimal understanding of the social skills of children under the age of 12.

Cognitive skills

Worksheets and materials in the packages revealed a general awareness on the part of material developers of the differences in children's ability to attend to detail. Package developers are better at using an appropriate amount of detail for older children's materials than for younger children's. Developers are sensitive to young children's limited memory. However, they do not seem to recognize that middle childhood (8-11 years old) is the time when memory strategies are developed and children enjoy activities that require the use of different strategies. Given the cognitive development of the youngest children, more demands have been placed on the

youngest children in terms of language skills (reading and writing), than is appropriate. This was not an issue for the two groups of older children.

There is an indication that younger children are sometimes exposed to packages that require the comprehension of abstract ideas, which is not appropriate given their cognitive abilities. However, this may be somewhat offset by the heavy use of concrete models for concepts by most of the packages reviewed. Most packages did not have many lessons that required the use of cause-effect reasoning or problem solving. This is appropriate for the youngest children, but not for the older two groups. Because very few packages engage youth in more long-term cause-effect reasoning by thinking about future implications of activities, the materials could be truncating the student's ability to consider lasting impacts of environmental problems. Ethical considerations relating to the environment are not discussed in the majority of packages reviewed. Although the use of the scientific method through experimentation and hands-on activities is done in very few lessons within the packages reviewed, more of these lessons were written for children 8-11 years old than for adolescents.

Discussion

The findings indicate that the EEMEQ can be used to assess EE materials to elucidate areas in need of improvement that may not be identified by more discipline-specific assessments. The gaps found in this pilot review of only 35 educational packages hint at areas that are lacking in environmental education materials, which may help explain the field's marginal success on increasing individual's pro-environment behavior.

Components of educational packages that should support the goals of environmental education are lacking in a number of critical ways. There was a diversity of topics covered in these packages, though not to any substantial depth. For example, foundational knowledge about how ecosystems function, the ecological implications of humans' activities and our dependence on nature were commonly not taught. Very few of the packages contained lessons that actively engage students in values clarification activities. In relation to pro-environment behavior, there is little effort to connect pedagogically environmental problems to the behaviors in which students or others engage. Additionally, there were few opportunities found in these packages for students to observe or actually engage in pro-environment behavior. Therefore, based on these results, students are left with a disjunct set of superficial facts, without an integrative framework of how these facts fit together or relate to their own behavior, daily lives, or ecosystem functioning.

The motivational components of these packages were also lacking. The packages reviewed were not designed to empower students to personally influence environmental problems, or to engender positive feelings towards the environment. Without providing investigation skills and practice solving environmental problems, it is no surprise to discover that these packages also did not teach students that their actions make a difference.

If these initial trial findings are repeated in larger, more controlled studies, the implications for conservation behavior are significant. To engage in conservation behavior, people need to have a well-rounded understanding of the issues, see how their actions contribute to the problem, and have the skills, values, and positive attitudes for empowerment and enact the necessary changes for solving/addressing the problem. The materials packages reviewed in this study are not supplying students with the foundation to encourage these learning experiences.

Though these findings suggest a number of promising avenues for future research and intervention, they should be considered speculative in light of a number of methodological

concerns. Because this study was conducted on a shoestring budget of $250 as a dissertation thesis, the author would do a number of things differently given more resources.

In relation to validity, a more diverse set of experts is needed to review the EEMEQ for construct and criterion-related validity. This panel should include experts from all of the fields used to develop the instrument, including EE, developmental theory, and cultural sociology. Once the expert panel thoroughly reviews the theoretical constructs and the resulting questions on the EEMEQ, it would be appropriate to evaluate a larger selection of materials packages to reflect a representative sampling of EE materials currently available on the market. To be able to address interrater-reliability in a more rigorous manner, other reviewers should assess entire packages in addition to the author. Also, a larger sample of packages should be assessed for test-retest reliability. In this next set of reliability studies, higher cut-off standards for Kappa and Pearson correlation coefficients should be used.

Once a more rigorous assessment of interrater and test-retest reliability are completed, it will be appropriate to address other forms of validity as well. Given that the instrument is based on "cause indicators" as the measurement model, internal consistency is not an appropriate form of reliability assessment (Bollen & Lennox, 1991). Therefore, it is important to assess the predictive validity of the instrument instead. One way to do this is to assess other variables such as learner outcomes, which are effects of the latent construct of materials quality. By demonstrating that learner outcomes are affected by the quality of the materials, we can determine predicative validity. Because the items assessed on the EEMEQ determine the quality of the materials, both the validity and reliability of the instrument can be demonstrated.

References

BALTES, P. (1987) Theoretical propositions of life-span developmental psychology: On the dynamics between growth and decline, *Developmental Psychology*, 23(5), pp. 611-626.

BALTES, P., REESE, H., & LIPPSITT, L. (1980) Life-span developmental psychology, *Annual Review of Psychology*, 31, pp. 65-110.

BOLLEN, K., & LENNOX, R. (1991) Conventional wisdom on measurement: A structural equation perspective, *Psychological Bulletin*, 110(2), pp. 305-314.

CASE, R. (1991) *The mind's staircase: Exploring the conceptual underpinnings of children's thought and knowledge,* (Hillsdale NJ, Erlbaum).

COHEN, J. (1960) A coefficient of agreement for nominal scales, *Educational and Psychological Measurement*, 20(1), pp. 37-46.

FISCHER, K. W. (1980) A theory of cognitive development: The control and construction of hierarchies of skills, *Psychological Review*, 87(6), pp. 477-531.

FLAVEL, J. H. (1971) Stage-related properties of cognitive development, *Cognitive Psychology*, 2, 421-453.

FODOR, J. A. (1983) *The modularity of mind* (Cambridge MA, MIT Press).

FORD, M. (1992) *Motivating humans: Goals, emotions, and personal agency beliefs,* (Newbury Park CA, Sage).

HUNGERFORD, H., PEYTON, R. B. & WILKE, R. J. (1980) Goals for curriculum development in environmental education, *Journal of Environmental Education,* 11 (3), pp. 42-47.

IOZZI, L. A. (1989) What research says to the educator: Part one: Environmental education and the affective domain, *Journal of Environmental Education,* 20 (3), pp. 3-9.

LEEMING, F., DWYER, W., PORTER, B. & COBERN, M. (1993) Outcome research in environmental education: A critical review, *Journal of Environmental Education*, 24 (4), pp. 8-21.

MINNER, D. D., (1997) *Environmental Education Curriculum Evaluation Questionnaire: A Reliability and Validity Study,* Unpublished doctoral dissertation, (The Pennsylvania State University, University Park, PA).

NORTH AMERICAN ASSOCIATION FOR ENVIRONMENTAL EDUCATION (1996) *Environmental Education Materials: Guidelines for Excellence,* (Troy OH, North American Association for Environmental Education).

PEDHAZUR, E. J. & PEDHAZUR SCHMELKIN, L. (1991) *Measurement, design, and analysis: An integrated approach,* (Hillside NJ, Lawrence Erlbaum Associates).

PIAGET, J. (1952) *The origins of intelligence in children,* (New York, Norton).

SIMMONS, D. A. (1995) *The NAAEE standards project: Papers on the development of environmental education standards,* (Troy OH, North American Association for Environmental Education).

TOURTILLOTT, L. & BRITT, P. (1994) *Evaluating environmental education materials. The environmental education toolbox--EE toolbox workshop. Resource manual,* Ann Arbor, MI: Michigan University School of Natural Resources and Environment, (ERIC Document Reproduction Service No. ED 384 533).

VOGT, W. P. (1993) *Dictionary of statistics and methodology: A non-technical guide for the social science,* (Newbury Park CA, Sage).

Table 1

Life-Span Concepts and Indicated Characteristics of Effective Educational Materials

Life-Span Concepts	Characteristics of Effective Educational Materials
1. Development takes place across the life-span.	• Education about the environment should take place across the life-span, and not just with certain age groups • Developmentally sensitive to the skills of certain age groups • Focus on developing skills (with age appropriate materials) in childhood that are to be used in adulthood
2. Development is characterize by multidirectionality through many pathways.	• Use various instructional approaches and teach key concepts in order to reach recipients with different life trajectories • Goals are clearly established so progress can be monitored • Encompass all the relevant components to a given issue
3. Development consists of both gains and losses in functioning.	• Promote competence by building on developmental gains of recipients rather than requiring use of declining skills
4. Development is plastic thus a good deal of change is possible within any area of development.	• Reflect the range of behaviors, attitudes and knowledge for a given developmental period
5. Development is embedded within a historical context and is thus influenced by events is society.	• Sensitive to cohort differences in recipients • Awareness of the effect of public opinion and political influences on recipients • Sensitive to non-normative events that have occurred in recipients lives
6. Any particular course of development can be understood as a result of human-environment interactions.	• Awareness of the multiple contexts that influence recipients • Target the multiple contexts of recipients lives' • Embedded in the existing institutions of recipients lives'
7. Development can only fully be understood and investigated from a multidisciplinary approach.	• Encompass the current state of knowledge derived from a variety of disciplines

Table 2

Components Distinguishing Quality of Environmental Education Material From the Field of Environmental Education Research

Component	Source
Sufficient ecological knowledge is necessary to make sound decisions. To understand ecology, one must also understand that there are various components to an ecosystem and processes in natural systems.	Hungerford, Peyton, & Wilke, 1980
Conceptual components to ecological foundational knowledge include: interactions and interdependence; energy flow, materials cycling, and homeostasis; ecological implications of man's activities and his communities; and humans are a component in ecosystems.	Hungerford, Peyton, & Wilke, 1980
Conceptual awareness of how individual behaviors impact on the environment from an ecological perspective is essential.	Hungerford, Peyton, & Wilke, 1980
The roles played by differing human values in environmental issues and the need for personal values clarification is an integral part of environmental decision making.	Hungerford, Peyton, & Wilke, 1980
The need for responsible citizenship action in the remediation of environmental issues is necessary.	Hungerford, Peyton, & Wilke, 1980
Environmental issues and environmentally-related problems should be understood at various levels-local, regional, international, and global.	Simmons, 1995
Materials should engage the students with the outdoors.	Simmons, 1995
Important concepts need to be conveyed in different ways so that students who learn differently can understand them.	Simmons, 1995
The materials should be sensitive to cultural diversity in its recipients.	Simmons, 1995
You need to make sure that the materials are current so that the recipients are receiving the current state of knowledge.	Simmons, 1995
If there are scientific/technical differences of opinion, the differences should be identified and presented in a balanced way.	Simmons, 1995
Content should be presented in a way that students can relate it to their everyday lives.	Simmons, 1995
The materials should have been reviewed by a spectrum of experts in the subjects covered.	Simmons, 1995

Table 2 Continued

Component	Source
Ideas should be expressed through unifying themes and big ideas. Ideas should be presented logically and connected throughout the materials package.	Simmons, 1995
Environmental materials should not simply talk about responsible behavior, but also model it.	Simmons, 1995
The material should be relevant to both urban and rural settings so that it is accessible to a wide range of audiences.	Simmons, 1995
The materials should state expected learner outcomes in terms of behavioral objectives and should suggest specific performance based assessments.	Simmons, 1995
To allow for the teachers to choose lessons that fit their needs, flexibility in the length of lesson is desirable.	Minner, 1997
To allow for the materials to be used throughout the year, then there needs to be lessons for different seasons to choose from.	Minner, 1997
To empower the participants in the area of environmental problems, solutions must be discussed.	Minner, 1997
Learning should be based on students constructing knowledge through research, discussion, and application to gain conceptual understanding.	Simmons, 1995; Hungerford, Peyton, & Wilke, 1980
A wide variety of environmental issues and the ecological and cultural implication of these issues should be addressed in environmental materials.	Simmons, 1995; Hungerford, Peyton, & Wilke, 1980
Materials should be adaptable to a range of learning situations. Where appropriate, the materials should suggest easy adaptations for different environments, such as indoor and outdoor environments, formal and informal settings, large and small classes, mixed-level classes, or rural, suburban, and urban settings.	NAAEE, 1996
The overall structure (purpose, direction, and logic of presentation) should be clear to educators and learners.	NAAEE, 1996
Students should learn in environments that extend beyond the boundaries of the classroom.	NAAEE, 1996
Materials should be adaptable to a range of learning situations.	NAAEE, 1996
Learners should be challenged to use and improve their critical thinking and creative skills.	NAAEE, 1996

Table 3

Percentages of Reliable Items Compared Across Sections of the Questionnaire

	Content	Structure	Context	Developmental Appropriateness
reliable interrater Kappas	33% (high) 53% (mod.) **86% (total)**	17% (high) 61% (mod.) **78% (total)**	29% (high) 36% (mod.) **65% (total)**	13% (high) 27% (mod.) **40% (total)**
reliable test-retest correlations	71% (high) 4% (mod.) **75% (total)**	67% (high) 6% (mod.) **73% (total)**	64% (high) 14% (mod.) **78% (total)**	67% (high) 0 (mod.) **67% (total)**
have both interrater and test-retest reliability	67%	61%	57%	2%
have neither interrater nor test-retest reliability	4%	11%	14%	13%
Reliable section sum and rating scores	75% (high) 25% (mod.) **100% (total)**	25% (high) 50% (mod.) **75% (total)**	25% (high) 25% (mod.) **50% (total)**	8% (high) 25% (mod.) **33% (total)**

Table 4

Number of Materials Packages to Receive Final Component Rating Relating to Quality of Environmental Education Goal Implementation

EEMEQ Component	None of the lessons	Very few on the lessons <36%	Some of the lessons 36-65%	A lot of the lessons >65%
Environmental Issues Investigation				
Diversity of environmental issues discussed	3	12	**17**	3*
Comprehensiveness of levels of environmental issues discussed (local, state, regional, national, global)	15	**17**	1	2*
Comprehensiveness of historical contexts within which environmental problems are discussed	5	**19**	8	3*
Solutions to environmental problems	7	**17**	9	2*
Ecological Foundational Knowledge				
Diversity of ecosystem components discussed	0	2	**17**	16*
Understanding ecosystem cycles	13	**19**	1	2*
Diversity of ecosystem functions discussed	10	**14**	7	4*
How ecosystem components interact	8	**17**	6	4*
Ecological implications of human's activities	6	**14**	13	2*
Connection of Humans to Ecosystem				
Human's connectedness and dependence on the natural world	**20**	13	2	0*
Connection of environmental lessons to personally relevant concerns like safety, social responsibility, or equality	**16**	14	4	1*
Values Clarification				
Teacher and student's exploration of own values regarding use of natural environment	**17**	15	2	1*
Teacher and student's exploration of other people's values regarding use of natural environment	**22**	11	1	1*
Pro-environment Behavior Awareness and Skills				
How our daily activities and choices affect the environment	11	**17**	4	3*
Lessons are relevant to students' personal daily lives	5	**15**	12	3*
Lessons model environmentally responsible behavior	15	**17**	3	0*
Lessons provide specific training in how to solve environmental problems and give students an opportunity to practice these skills	16	**18**	1	0*
Engaging in citizenship action	**21**	14	0	0*
Providing information about citizenship action	**27**	8	0	0*
Human and ecological costs and benefits of an action which impact the natural world	**21**	13	0	1*

*highest quality rating category
mode is noted in bold type

Table 5

Number of Materials Packages to Receive Final Component Rating Relating to Quality of Contextual Sensitivity

EEMEQ Component	None of the lessons	Very few on the lessons <36%	Some of the lessons 36-65%	A lot of the lessons >65%
Different Settings				
Lessons require access to a specific type of physical space such as a large indoor or outdoor area	14	**21***	0	0
Lessons require access to a specific type of natural habitat	**27**	5*	2	1
Flexibility to allow lessons to be adapted to different settings	1	**13**	12	9*
Flexibility to be conducted indoor and outdoors	**21**	6	5	3*
Cost				
Lessons do not require special equipment	1	7	12	**15***
Low cost of curriculum	0	3	4	**28***
Different Users				
Variety of teaching methods used	0	0	1	**34***
Convey key concepts in several ways (auditory, visual, tactile)	2	6	**14**	13*
Lessons use information or techniques from two or more subject areas	0	7	8	**20***
Multiple levels of intervention possibilities are discussed (self, family, community, society)	6	8	**11**	10*
Provide ways of assessing participant's baseline understanding and skills at beginning of lessons	13	**14**	5	3*
Cultural minorities are represented in illustrations	**27**	1	6	1*
Bias				
Date of publication is recent	5	8	10	**12***
Curriculum development and review team clearly identified	0	8	11	**16***
Causes and consequences of environmental issues are presented in a balanced way	0	5	**15**	**15***

*highest quality rating category
mode is noted in bold type

Table 6

Number of Materials Packages to Receive Final Component Rating Relating to Quality of Teacher Support and Student Motivation

EEMEQ Component	None of the lessons	Very few on the lessons <36%	Some of the lessons 36-65%	A lot of the lessons >65%
Teacher Support				
Contains background material that explains key concepts used in the lessons	0	2	6	**27***
Lessons are logically connected to each other	1	2	11	**21***
Variability in the time of year when lessons can be conducted	0	0	4	**31***
Number of additional resources/sources of information provided (general information)	0	7	1	**27***
Variability in length of lessons	0	7	**15**	13*
Give information about where to get additional resources/information about topics in the lessons	6	10	**11**	8*
Increase Student Motivation				
Teach about topics which are supported by a majority of society	1	0	8	**26***
Provide the skills to accomplish the stated goals of the lessons	2	8	6	**19***
Provide ways of evaluating effectiveness of lessons	5	8	6	**16***
Teaches students that their personal actions can make a difference in solving environmental problems	11	**20**	4	0*
Facilitate positive emotional experiences about the natural world	**22**	11	2	0*
Lessons have activities with cognitive, emotional, and behavioral components	**26**	9	0	0*
Lessons are designed to provide immediate outcomes and long-term change in awareness about behavior, attitudes or knowledge	**17**	15	2	1*

*highest quality rating category
mode is noted in bold type

Table 7

Number of Materials Packages to Receive Final Component Rating Relating to Quality of Developmental Appropriateness

EEMEQ Component (age range of students)	None of the lessons	Very few on the lessons <36%	Some of the lessons 36-65%	A lot of the lessons >65%
Physical Skills				
Lessons place demands on physical strength such a lifting heavy objects (5-7)	**11***	0	1	0
Lessons include some gross motor activity (5-7)	0	**4**	**4**	**4***
Lessons require children to manipulate small objects or draw precise pictures (5-7)	**4***	**4**	3	1
Social Skills				
Ratio of individual to group activities are age appropriate (12-18)	0	0	5	**6***
Ratio of individual to group activities are age appropriate (8-11)	0	0	**7**	5*
Ratio of individual to group activities are age appropriate (5-7)	3	**5**	4	0*
Cognitive Skills				
Worksheets provide a lot of details (5-7)	2*	**5**	3	2
(8-11)	1	1	**6**	**4***
(12-18)	0	3	3	**5***
Worksheets use minimal detail and bright colors (5-7)	4	**5**	1	2*
(8-11)				
Lessons require the use of memory strategies (5-7)	1*	**8**	2	1
(8-11)	**4**	**4**	3	1*
Lessons require understanding and using abstract ideas (5-7)	5*	**6**	1	0
(8-11)	2	4*	**5**	1
(12-18)	0	1	**5**	**5***
Lessons use concrete objects to communicate key concepts (5-7)	0	0	1	**11***
(8-11)	0	0	5	**7***
Lessons require cause-effect reasoning (5-7)	**9***	2	1	0
(8-11)	3	**4**	**4**	1*
(12-18)	0	**5**	3	3*
Lessons require children to systematically solve problems (5-7)	**9***	2	0	1
(12-18)	**7**	4	0	0*
Lessons encourage students to think about future consequences of current environmental actions (12-18)	0	**7**	4	0*
Lessons require children read or write (5-7)	0*	**6**	4	2
(8-11)	0	2	1	**9***
(12-18)	0	0	1	**10***
Lessons allow students to explore through experimentation (8-11)	1	**5**	**5**	1*
(12-18)	2	**7**	1	1*
Lessons encourage adolescents to think about ethical issues relating to the environment (12-18)	**8**	2	1	0*

*highest quality rating category
mode is noted in bold type

Environmental Education Materials Evaluation Questionnaire

©1998

Daphne D. Minner, Ph.D.

Content

1. What types of teaching methods are used in the curriculum? (*check all that apply*)

_____VERBAL INTERACTION
- _____discussion with teacher and/or peers (didactic instruction doesn't count)
- _____teacher telling or reading a story
- _____role playing
- _____group presentations to other students

_____PHYSICAL EXPLORATION
- _____conducting experiments
- _____playing games with gross motor activity
- _____field observations/surveys (outdoor activities)

_____MENTAL STIMULATION
- _____imagination/visualization
- _____reflective techniques (solo sits)
- _____keeping a journal/ creative writing
- _____generating solutions to environmental problems or dilemmas
- _____art and crafts projects
- _____mapping techniques
- _____word games, puzzles, quizzes
- _____demonstrations by the teacher

2. Which ecosystem components are discussed in this curriculum? (*check all that apply*)

Biotic	Abiotic
_____soil	_____air (temperature, pollution)
_____microbes	_____sun light
_____plants	_____water (precipitation, standing)
_____humans	
_____animals	

3. How many of the lessons address how ecosystem components interact with each other? (*to qualify a lesson must discuss at least 2 ecosystem components and how they relate to each other explicitly) (Ex., how wetland plants filter water*)

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

4. Which ecosystem cycles are described in this curriculum? (*check all that apply*)

_____food chain/food web (*sun→ plants→ animals→ etc.*)

_____bio-geo-chemical cycles (*decomposition, water cycle, erosion*)

_____homeostasis (*the tendency of natural systems to maintain balance or to establish balance over time) (Ex., the role trees play in climate control in rain forests*)

How many of the lessons address...

5. ecological implications of human's activities and communities? (*how we change the environment*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

6. how an individual person's daily activities and choices affect the environment? (*daily activities include consumer choices, energy use, transportation choices*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

7. student's exploration of their own values/attitudes regarding the use of the natural environment? (*a solitary activity*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

8. student's exploration of other people's values/attitudes regarding the use of the natural environment? (*an interactive activity*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

9. how humans need/ benefit from the environment or are harmed by an unhealthy environment?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

10. engaging in action in support of the environment (*actions include: civic, educational, financial, legal, physical, or persuasive*)?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

11. providing information about how students can become involved in action in support of the environment (*actions include: civic, educational, financial, legal, physical, or persuasive*)?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

How many of the lessons address...

12. human costs and benefits of an action which impacts the environment as well as ecological costs and benefits? (*must discuss costs and benefits to humans and costs and benefits to other members of ecosystem to qualify*)

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

13. solutions to environmental problems? (*gives specific examples*)

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

14. how the environment relates to personal health or social justice?

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

15. At which geographic levels are environmental problems discussed? (*if environmental problems are not discussed in the lesson then leave this question blank*)

_____local
_____state/provincial
_____regional
_____national
_____global

16. In which historical contexts are environmental problems (causes or consequences) discussed? (*if environmental problems are not discussed in the lesson then leave this question blank*)

_____immediate
_____within 20 years from present
_____within 50 years from present
_____within 100 years from present
_____within 500 years from present
_____more than 500 years from present

17. How many different environmental issues are discussed in the curriculum? (*check all that apply*)

_____AIR QUALITY
- _____global climate change
- _____ozone depletion
- _____pollution
- _____acid deposition

_____WATER QUALITY
- _____pollution
- _____aquifer depletion
- _____wetlands use and management

_____SOIL QUALITY AND QUANTITY
- _____erosion
- _____toxic leaching
- _____salinization of soil

_____WILDLIFE AND HABITAT LOSS
- _____endangered species
- _____depleted fisheries
- _____deforestation/desertification/devegitation of grasslands

_____ENERGY
- _____fossil fuel depletion
- _____alternative energy (solar, natural gas, nuclear, dams)
- _____energy use

_____LAND USE
- _____recreational use of wild areas
- _____grazing on public lands
- _____logging
- _____highway/road construction
- _____filling in wetlands
- _____agriculture

_____HUMAN POPULATION AND HEALTH
- _____food shortages due to growing population
- _____environmentally induced illness
- _____religious beliefs influencing birth control

_____WASTE
- _____municipal solid waste
- _____waste reduction strategies (reduce, reuse)
- _____recycling
- _____incineration
- _____composting

Contextual Sensitivity

18. How flexible are the lessons so they can be used in different contexts/settings *(rural, suburban, urban)*?

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

How many of the lessons in the curriculum:

19. require special/expensive equipment which are not provided with the curriculum (*Ex. computers, beakers, microscopes, hand lenses, dip nets, field guides, specialized art supplies--extra large paper, clay, paints, etc.*), ?

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

20. do not require any equipment, use common/cheap household items, or items commonly found in schools? *(Ex: cans, plastic containers, newspapers, crayons, paper, glue, scissors, paste)*

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

21. require access to a specific type of natural habitat such as ponds, forests, wetlands, fields, oceans, rivers?

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

22. require access to a specific type of physical space such as a large indoor/outdoor area?

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

23. convey key concepts in several ways (auditory, visual, tactile) so that all students can understand them? (*must have all three to qualify*)

auditory--teachers explain ideas/concepts in the lesson,
visual--teachers show pictures to explain concepts in the lesson or give a demonstration,
tactile--teachers provide props for kids to touch that represent the ideas in the lesson

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

How much variability is there in:

24. the location where the lessons are to be conducted?

Lessons that can be done either indoors or outdoors:_____

Lessons that are designed to be used both indoors and outdoors:_____

Lessons that are designed to be used indoors only:_____

Lessons that are designed to be used outdoors only:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

none = all of the lessons are to be used "indoors only" or "outdoors only"
very little = most of the lessons are to be used "indoors only" or "outdoors only" but some are in the other two categories
some = evenly divided amongst all four categories
a lot = most of the lessons are in the "either indoors or outdoors" category and/or the "both indoors and outdoors" category

25. How frequently are cultural minorities represented in the illustrations in the curriculum? (*flip through the entire curriculum before answering this question*)

❑	❑	❑	❑
none	infrequently (1-35% of pictures)	somewhat (36-65%)	often (66-100%)

26. Do the lessons teach participants what they can do: *(check all that apply)*

_____on their **own** to help the environment
_____as part of a **family** to help the environment
_____as a member of a **community** to help the environment
_____to change institutions or **society** to help the environment

27. When was the curriculum published or last revised?

❑	❑	❑	❑
not available	more than 7 years ago	between 4 and 7 years ago	within the last three years

28. How expensive is the curriculum to purchase?

❑	❑	❑	❑
not available	more than $ 30	between $ 10 and $ 30	free/loan or less than $ 10

29. Is it made clear who developed and reviewed the material in the curriculum? *(to be clear, it should list who funded the curriculum development, who developed the lessons--names and titles, and who reviewed the lessons--names and titles)*

❑	❑	❑	❑
not applicable	no	somewhat clear	yes

30. Do the people who developed and reviewed the curriculum represent a spectrum of experts in the subjects covered in the curriculum?

❑	❑	❑	❑
not applicable	no	somewhat	yes

31. If there are scientific/technical differences of opinion about the topics in the lessons, are these differences identified and presented in a balanced way? *(if only one point of view is presented then it is not balanced)*

❑	❑	❑	❑
not applicable	no (biased)	somewhat	yes (balanced)

lessons:_____

Structure

How many of the lessons:

32. provide ways of evaluating effectiveness of the lesson after it is completed? *(with a quiz, question/answer period, discussion, some tangible product like an identified leaf pressing) (to count, the evaluation should be a standard part of the lesson, not an "extension")*

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

33. provide ways of assessing participant's baseline understandings and skills at the beginning of the lesson? (*a pre-lesson quiz, asking the students what they already know/feel about the topic in the lesson*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

34. have activities with cognitive components (*learning something new*)?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

35. have activities with affective/attitudinal components (*facilitating an emotional experience about the topic*)?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

36. have activities with behavioral components (*teaching pro-environmental behavior*)?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

37. have activities with cognitive, affective/attitudinal, and behavioral components? (*must have all three components to qualify for this question*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

How many of the lessons:

38. use information or techniques from two or more subject areas (*Ex. science, social studies, art, math, music, physical education*)?

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

39. contain background material (for the teachers) that explains key concepts used in the lessons? (*introduction that gives definitions of terms, explains connections between concepts in the lesson*)

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

40. in the curriculum are logically connected with each other through consistent themes (*Ex. of themes are: "conservation of natural resources is important", "pesticide use is good for agriculture"*)

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

Within any given section/unit of the curriculum how many of those lessons... (*if the curriculum is not divided into sections then rate the whole curriculum as one unit*)

41. cover different aspects of one topic? (*Ex. the Chesapeake Bay is one topic and there are different lessons on the aquatic life in the bay, the effect of agricultural run-off on the bay, ect.*)

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

42. cover unrelated topics? (*Ex. one lesson could cover the anatomy of raptors and another lesson could cover discovering a wetland without any reference in one to the other*)

lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

How many of the lessons in the curriculum...

43. have suggestions about long-term projects that students could do? (*usually given as an "extension")*

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

44. are designed to have the option of being carried out over more than one "class period"?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

45. give information about where to get additional resources/information about the topics in the lesson?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

46. model environmentally responsible behavior in the way that they are to be carried out? (*Ex. explicitly state or encourage the use of recycled or reused materials for the activity; explicitly state or encourage non-intrusive observation of wildlife and collection of non-animal specimens*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

47. provide specific training in how to solve environmental problems and give students an opportunity to practice these skills? (*by having them formulate questions about an environmental issue, collect data on that issue--reading, analyze their data, and draw conclusions about an appropriate solution to that environmental issue)—practice solving problems*

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

48. present recipients with an environmental issue which they investigate, formulate an action plan to address the issue, and give them an opportunity to act on their analysis/conclusions?—*acting on solutions*

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

How much variability is there in...
(if not listed then make an estimate)

49. the length of time required for the lessons in the curriculum?
30 minute lessons:_____
1 hour lessons:_____
2 hour lessons:_____
3 or more hour lessons:_____

OR

1/2 class period lessons:_____
1 class period lessons:_____
2 class periods lessons:_____
3 or more class periods lessons:_____

❑ none ❑ very little ❑ some ❑ a lot

none = all of the lessons are in the same time category
very little = lessons are divided between two categories
some = lessons divided amonst three categories
a lot = some lessons in all four categories

How much variability is there in...
(if not listed then make an estimate)

50. the time of the year when the lessons in the curriculum can be conducted?
lessons that must be done in one particular season:_____
lessons that can be done in 2 of the 4 seasons:_____
lessons that can be done in 3 of the 4 seasons:_____
lessons that can be done in any season:_____

❑ none ❑ very little ❑ some ❑ a lot

none = all of the lessons must be done in one season
very little = majority of the lessons can be done in 2 of the 4 seasons
some = majority of the lessons can be done in 3 of the 4 seasons
a lot = majority of the lessons can be done in any season

How many of the lessons in the curriculum...

51. are explicitly relevant to the students' personal daily lives? (*Ex. a lesson on waste in which the students collect all the trash they generate for a day*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

How many of the lessons in the curriculum...

52. have objectives which can be achieved by the activities in the lesson? *(how well do the objectives match what is done in the lesson?)*

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

53. teach about topics which are supported or accepted by a majority of society? *(not controversial issues; not issues which are very biased in one direction or the other) (some topics which are considered controversial include: alternative energy, waste incineration, birth control, pesticide use in agriculture, timber and mineral extraction off public lands)*

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

54. How many additional resources/sources of information does the curriculum provide? *(usually located at the end of the book)*

❑ none ❑ very few (1-4 sources) ❑ some (5-10 sources) ❑ a lot (>10 sources)

55. How effective is the format of the curriculum at providing essential planning information? *(check all of the following which are provided and easy to read)*

_____length of time needed to conduct each lesson
_____materials needed to conduct the lessons
_____group size the lessons can be used with
_____objectives/outcomes of each of the lessons
_____subject areas covered in each lesson (math, history, science, art, ect.)
_____age/grade level lessons are designed for
_____procedure for each activity in the lessons

❑ not effective ❑ little effectiveness ❑ somewhat effective ❑ very effective

not effective = none of the checklist items
little effectiveness = 1-2 of the checklist items
somewhat effective = 3-5 of the checklist items
very effective = 6 or 7 of the checklist items

NOTE: For this last section you should only fill out one part (unless you are interested in lessons designed for grades K-12). Part I is for curriculum designed for grades K-2; Part II is for grades 3-6; and Part III is for grades 7-12).

Developmental Appropriateness Part I (ages 5-7, grades K-2)

How many of the activities require the children to:

56. manipulate small/delicate objects or to draw precise pictures?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

57. remember information from previous activities or leaning experiences to complete the lesson?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

58. understand and use abstract ideas to complete the lesson? (*abstract = a concept that can have a representation or example of it, but is itself not tangible ie. myth, limiting factors*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

59. understand cause-effect relationships to be able to complete the lesson? (*Ex. Acidification of streams causes fish to die*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

60. read or write?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

61. test hypotheses and systematically solve problems? (*have to come up with their own answers to questions and try them to see if they are correct*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

62. How many of the activities use concrete objects like toys, animals, pictures, or plants to communicate key concepts in the lesson?
lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

63. **What kind of social interaction is required to complete the lesson?**
Children need to cooperate with other children to complete the activity?
lessons:_____

Children need to work alone to complete the activity?
lessons:_____

❑	❑	❑	❑
all group or alone activities	half are alone and half are group activities	the **majority** of the lessons allow the children to work **alone** with a few group activities	the **majority** of the lessons allow the children to work with a **group** with a few alone activities

How many of the lessons focus on physical activity?
lessons:_____

Of the lessons which focus on physical activity, how many of them...
64. place demands on physical strength such as lifting heavy objects *(more than 5 pounds)*?
lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

(percentages calculated out of the total lessons which focus on physical activity, not all lessons reviewed)

65. How many of the lessons in the curriculum include some gross motor activity?
lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

How many of the lessons provide handouts for the students?
lessons:_____

Of the lessons which provide handouts, how many of the handouts...
66. provide a lot of details (*realistic drawings; lots of words in puzzles; elaborate stories*)?
lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

(percentages calculated out of the total lessons which provide handouts, not all lessons reviewed)

67. use cartoon-like simplicity to draw attention to the prominent characteristics of the drawing?
lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

(percentages calculated out of the total lessons which provide handouts, not all lessons reviewed)

Developmental Appropriateness Part II (ages 8-11) grades 3-6

How many of the activities require the children to:

68. remember information from previous activities or leaning experiences to complete the lesson?

Lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

69. understand and use abstract ideas to complete the lesson? (*abstract= a concept that can have a representation or example of it, but is itself not tangible ie. myth, limiting factors*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

70. understand cause-effect relationships to be able to complete the lesson? (*Ex. Acidification of streams causes fish to die)*

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

71. read or write?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

72. How many of the activities use concrete objects like toys, animals, pictures, or plants to communicate key concepts in the lesson?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

73. How many of the activities allow the children to explore (hands-on) through experimentation? (*conduct experiments, manipulate natural objects to learn more about them*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

74. **What kind of social interaction is required to complete the lesson?**
Children need to cooperate with other children to complete the activity?
lessons:_____

Children need to work alone to complete the activity?
lessons:_____

❑	❑	❑	❑
all group or alone activities	half are alone and half are group activities	the **majority** of the lessons allow the children to work **alone** with a few group activities	the **majority** of the lessons allow the children to work with a **group** with a few alone activities

How many of the lessons provide handouts for the students?
lessons:_____

Of the lessons which provide handouts, how many of the handouts...
75. provide a lot of details (*realistic drawings; lots of words in puzzles; elaborate stories*)?
lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

(percentages calculated out of the total lessons which provide handouts, not all lessons reviewed)

Developmental Appropriateness Part III (ages 12-18) grades 7-12

How many of the activities/lessons require adolescents to:

76. understand and use abstract ideas to complete the lesson? (*abstract= a concept that can have a representation or example of it, but is itself not tangible ie. myth, limiting factors*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

77. understand cause-effect relationships to be able to complete the lesson? (*Ex. Acidification of steams causes fish to die*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

78. read or write?

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

79. test hypotheses and systematically solve problems? (*have to come up with their own answers to questions and try them to see if they are correct*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

80. think about the future consequences of current environmental actions? (*Ex. how continued dependence on fossil fuel might impact our future*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

81. How many of the activities allow the adolescents to explore (hands-on) through experimentation? (*conduct experiments, manipulate natural objects to learn more about them*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

82. How many of the activities encourage the adolescents to think about ethical issues relating to the environment? (*Ex. extinction of species as a result of human behavior*)

lessons:_____

❑ none ❑ very few (1-35%) ❑ some (36-65%) ❑ a lot (66-100%)

83. **What kind of social interaction is required to complete the lesson?**
Children need to cooperate <u>with other</u> children to complete the activity?
lessons:_____

Children need to work <u>alone</u> to complete the activity?
lessons:_____

❑	❑	❑	❑
all group or alone activities	half are alone and half are group activities	the **majority** of the lessons allow the children to work **alone** with a few group activities	the **majority** of the lessons allow the children to work with a **group** with a few alone activities

How many of the lessons provide handouts for the students?
lessons:_____

Of the lessons which provide handouts, how many of the handouts...
84. provide a lot of details (*<u>realistic</u> drawings; lots of words in puzzles; elaborate stories*)?
lessons:_____

❑	❑	❑	❑
none	very few (1-35%)	some (36-65%)	a lot (66-100%)

(percentages calculated out of the total lessons which provide handouts, not all lessons reviewed)

APPENDIX B

Annotated List of Material Packages Reviewed

ACTION FOR A CLEANER TOMORROW
by: The South Carolina Office of Solid Waste Reduction and Recycling

ACTIONS SPEAK! (LOUDER THAN WORDS): THE SOCIAL AND ENVIRONMENTAL IMPACT OF SOLID WASTE
by: Peters & Wissman
for: Illinois Dept. of Commerce and Community Affairs Bureau of Energy and Recycling

A CURRICULUM GUIDE FOR RECYCLING EDUCATION (K-6)
Printed by: Pennsylvania Department of Education

ALWAYS A RIVER: SUPPLEMENTAL ENVIRONMENTAL EDUCATION CURRICULUM ON THE OHIO RIVER AND WATER (Grades k-12)
by: The Federal Environmental Protection Agency (EPA)

ANIMAL TRACKS: ACTIVITY GUIDE FOR EDUCATORS (grades 4 to 6)
by: The National Wildlife Federation (NWF)

A-WAY WITH WASTE: A WASTE MANAGEMENT CURRICULUM FOR SCHOOLS (second edition)
by: The Washington State Dept. of Ecology; Litter Control and Recycling Program

CONNECTIONS (teacher and student guides)
by: Eco Education

CONNECTIONS: A CURRICULUM IN APPROPRIATE TECHNOLOGY FOR FIFTH AND SIXTH GRADES
by: The National Center for Appropriate Technology

CYCLING BACK TO NATURE: FOOD PRODUCTION AND PESTICIDES
by: The National 4-H Council

DOWN THE DRAIN
by: The Massachusetts Water Resources Authority

EARTH MATTERS: STUDIES FOR OUR GLOBAL FUTURE
by: Wasserman & Doyle
for: Zero Population Growth

ECO-INQUIRY
by: Kass Hogan
for: Institute of Ecosystem Studies

ENERGIZING YOUR FUTURE WITH ENERGY, ECONOMICS AND THE ENVIRONMENT
by: The National 4-H Council

ENVIRONMENTAL RESOURCE GUIDE: AIR QUALITY (grades 6-8)
by: The Tennessee Valley Authority, Environmental Education Section
for: Air and Waste Management Association

4th R RECYCLING CURRICULUM (K-5th grade)
developed by: San Francisco school teachers
sponsored by: The San Francisco Recycling Program and the City and County of San Francisco

GROWING GREENER CITIES: AN ENVIRONMENTAL EDUCATION GUIDE
by: American Forests

APPENDIX B

LET'S REDUCE AND RECYCLE: CURRICULUM FOR SOLID WASTE AWARENESS
by: The Federal Environmental Protection Agency (EPA)

LIVING IN WATER: AN AQUATIC SCIENCE CURRICULUM FOR Grades 4-6
by: The National Aquarium in Baltimore

LIVING LIGHTLY IN THE CITY: AN URBAN ENVIRONMENTAL EDUCATION CURRICULUM
(grades 4-6)
by: O'Connor & McGlauflin
for: National Audubon Society; Schlitz Audubon Center

MAGICAL MIGRATING MONARCHS
by: Levicoff & Levicoff

MUNICIPAL SOLID WASTE MANAGEMENT: SOURCE REDUCTION; TEACHERS GUIDE
by: Aurora Colorado Public Schools
funded by: EPA

ONE BIRD TWO HABITATS: A MIDDLE SCHOOL ENVIRONMENTAL EDUCATION CURRICULUM ON MIGRATORY BIRDS
by: Gilcrest, Row & Borneman
for: Wisconsin Dept. of Natural Resources

OUR GREAT LAKES CONNECTION: A CURRICULUM GUIDE FOR grades k-8
by: Entine
for: University of Wisconsin Extension Environmental Resources Center

PENNSYLVANIA STATE PARKS ACTIVITIES FOR ENVIRONMENTAL LEARNING (1989)
by: The Dept. of Conservation and Natural Resources

LEAP: LEARNING ABOUT ECOLOGY, ANIMALS AND PLANTS
by: Cornell University

PROJECT LEARNING TREE: ENVIRONMENTAL EDUCATION ACTIVITY GUIDE
(pre k-8) third edition
by: American Forest Foundation

PROJECT WET: CURRICULUM AND ACTIVITY GUIDE (K-12)
by: The Watercourse and Western Regional Environmental Education Council

PROJECT WILD (1992)
by: Western Regional Environmental Education Council

RECYCLED: MOBIUS CURRICULUM: UNDERSTANDING THE WASTE CYCLE
second edition
by: Browning-Ferris Industries

RECYCLING TODAY FOR A CLEANER TOMORROW: A CURRICULUM FOR grades K-12
by: Center for Hazardous Materials Research
for: The Allegheny County Division of Waste Management

TREES + ME = FORESTRY
by: Hansen and Finley
for: Pennsylvania State University

TURNING THE TIDE ON TRASH: A LEARNING GUIDE ON MARINE DEBRIS
by: EPA

APPENDIX B

WATER WATCHERS: WATER CONSERVATION CURRICULUM FOR JUNIOR HIGH SCHOOL SCIENCE AND SOCIAL STUDIES CLASSES
by: Massachusetts Water Resources Authority

WATER WIZARDS: SCHOOL PROGRAM ON WATER CONSERVATION FOR 3rd AND 4th GRADE LEVELS
by: Massachusetts Water Resources Authority

WOW! THE WONDERS OF WETLANDS: AN EDUCATOR'S GUIDE
by: Environmental Concern Inc. and The Watercourse
funded by: EPA and U.S. Dept. of Interior, Bureau of Reclamation

APPENDIX C

Overall Summary of Material Packages Characteristics

Materials Package Name	Topic	Grade written for	Percentage of lessons reviewed	Quality Rating*
Action for a cleaner tomorrow	Trash	K-8, 6-12	12	H
Actions speak!	Trash	6-8	33	M
A curriculum guide for recycling education	Recycling	K-6	16	L
Always a river	Water	K-12	12	L
Animal tracks	Multiple	4-6	26	L
A-way with waste	Trash	K-12	12	M
Connections: A curriculum in appropriate technology	Technology and the environment	5-6	40	L
Connections	Multiple	6-9	43 student 24 teacher	M
Cycling back to nature	Food and pesticides	K-12	29	M
Down the drain	Water	5-8	45	M
Earth matters	Multiple	9-12	41	M
Eco-inquiry	Natural cycles	5-6	33 of modules 28 of lessons	H
Energizing your future with energy, economics and the environment	Technology and the environment	K-12	42	L
Environmental resources guide to air quality	Air quality	6-8	56	H
4th R recycling curriculum	Recycling	K-5	21	M
Growing greener cities	Forestry	2-6	54	L
Let's reduce and recycle	Trash	K-12	19	L
Living in water	Water	4-6	33	L
Living lightly in the city	Multiple	4-6	18	M
Magical migrating monarchs	Wildlife	K-12	36	M
Municipal solid waste management	Trash	K-12	19	M
One bird two habitats	Wildlife	5-8	45	M
Our great lakes connection	Water	K-8	21	L
Pennsylvania state parks activities for environmental learning	Multiple	K-12	12	L
LEAP	Multiple	3	37	L
Project learning tree	Forestry	K-8	16	H
Project wet	Water	K-12	16	H
Project wild	Wildlife	K-12	8	H
Recycled: Mobius curriculum	Trash	4-6	53	M
Recycling today for a cleaner tomorrow	Recycling	K-12	13	M
Trees + Me = Forestry	Forestry	2-6	50	L
Turning the tide on trash	Water	2-6	43	L
Water watchers	Water	7-8	60	L
Water wizards	Water	3-4	29 activities	L
WOW!	Water	K-12	18	M

L=low M=medium H=high

SE061089

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

REPRODUCTION RELEASE

(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title: Environmental Education Materials Evaluation Questionnaire (EEMEQ): Using Interdisciplinary Theory to Assess Quality	
Author(s): Daphne D. Minner, Ph.D.	
Corporate Source:	Publication Date: Unpublished

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, *Resources in Education* (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign at the bottom of the page.

The sample sticker shown below will be affixed to all Level 1 documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1

Level 1

✓ Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g., electronic) *and* paper copy.

The sample sticker shown below will be affixed to all Level 2A documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY ,

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2A

Level 2A

Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only

The sample sticker shown below will be affixed to all Level 2B documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2B

Level 2B

Check here for Level 2B release, permitting reproduction and dissemination in microfiche only

Documents will be processed as indicated provided reproduction quality permits.
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Signature: Daphne D. Minner	Printed Name/Position/Title: Daphne D. Minner, Ph.D. Senior Research Associate	
Organization/Address: EDC, 55 Chapel St., Newton MA 02458-1060	Telephone: 617-618-2461	FAX:
	E-Mail Address: dminner@edc.org	Date: 6-26-02